MARINE REVIEW

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LAKE FLEET ON THE ATLANTIC.

EIGHTEEN REACHED NEW YORK AND BOSTON, EIGHT ARE IN NOVA SCOTIA, FOUR WERE LOST AND TEN ARE STILL IN THE ST. LAWRENCE—AFFAIRS OF THE ATLANTIC TRANSPORTATION CO.

As a result of trips to New York made by several vessel owners of the lakes who chartered their ships to the Atlantic Transportation Co., something definite is being learned about the tangled affairs of that company. Forty vessels in all, thirty-seven barges and three steamers, left the lakes under charter to the Atlantic company. Eighteen of these vessels, including the three steamers, managed to work through to New York or Boston, four were wrecked and given up as total losses, eight got only as far as Nova Scotia points, and ten were left in the St. Lawrence river above the rapids. The fleet as now divided is as follows:

Delivered in New York, Boston or New England points—steamers Katahdin, Aragon and S. J. Murphy, and barges Becker, Wadena, Annie M. Ash, Alverson, Chas. Foster, F. A. Georger, M. S. Bacon, T. P. Sheldon, S. L. Watson, M. W. Paige, H. A. Hawgood, Iron State, Iron City, S. V. R. Watson and Thos. L. Parker. At Nova Scotia points—Barges Massassoit, Camden, Fitzpatrick, David Wallace, Redwing, Verona, Moonlight and W. S. Crosthwaite.

Held in the St. Lawrence—Barges Rutter, H. W. Sage, S. H. Foster, Metacomet, Chas. Wall, Shawnee, Ewing, McGregor, Halloran and Helvetia.

Lost—Barges Harvey Brown, Sandiego, John O'Neill and Porter.

Since the appointment of M. E. Ingalls, Jr., and Edward P. Meany as receivers for the company, the officials of the Chesapeake & Ohio Railway have taken an interest in trying to put into service the vessels that have reached New York and New England points, and are treating with the owners of these vessels with a view to modifying the contracts, at least as far as insurance is concerned. J. C. Gilchrist of Cleveland, who has seven vessels in New York and three in Nova Scotia, has arranged to accept insurance on the vessels in New York that involves practically only total loss. It is said that the best insurance the receivers of the company can secure is total loss and general average up to about 20 per cent. On the vessels in Nova Scotia Mr. Gilchrist agrees to bear any expense that may be held against them in excess of $500 per boat. On this basis his charter is to continue at the rental originally agreed upon. This will give a fair idea of what the receivers of the company, who are said to be directed in their movements by George Ingalls, assistant to the president of the Chesapeake & Ohio Co., are trying to do with the owners of the lake ships. They care nothing for the ten vessels in the St. Lawrence river, which must all be brought back to the lakes next spring, unless a new arrangement is made, and this very probably at the expense of the owners, as there would be very little satisfaction in trying to proceed against a corporation in the hands of receivers. Neither are the receivers very much concerned, for the present at least, in the vessels held up at Nova Scotia points. They are asking owners of these vessels to bear a share of the bills that are charged against them. But there is business, and plenty of it, for the vessels that are available on the coast for the Newport News coal trade, and this is why a settlement regarding the vessels in New York and Boston may be made more readily than will be the case with the vessels that did not get through.

As yet only two cargoes of coal have been carried in any of the lake vessels. These were cargoes moved by the Georger and Bacon. In taking the fleet down to the coast the Atlantic company expended $157,000. Conditions of weather, even on the St. Lawrence, lateness of the season, and severe gales on the Atlantic, all acted against success with this big undertaking, and it is admitted now that some serious mistakes were made also, not least of which was the attempt in the rush of matters towards the end to put three or four barges in a tow without sufficient steamboat power and without providing towing machines or taking other precautions that were required under the circumstances.

Another case growing out of the failure of the Atlantic company has been on trial in the Maine courts. It was reported, immediately after the failure, that several new barges building in Maine, were not in any sense the property of the transportation company, but were building to be used in the coal business under charter. The Western National Bank of New York, a short time ago, applied for and were granted an injunction against the Atlantic Transportation Co., W. H. Besse of New Bedford, Mass., and William Rogers, the ship builder of Bath, Me., to prevent them from launching, controlling or transferring the title of the barge New York, now building by Mr. Rogers, in such a way as to enable it to escape the claims of the petitioner. It was asked that the barge be transferred by the court to the complainant bank or sold by a receiver to be appointed by the court, the proceeds of the sale to be used to part pay the loan of $53,000 made by the complainant to the Atlantic Transportation Co. and for which the barge in question became part surety. The court was asked to determine whether William Rogers had any lien on the barge of such a nature as to insure priority of claim as against the petitioner. It seems that the bank above mentioned made arrangements to loan to the Atlantic company $250,000, and actually did loan $53,000. The four barges building at Bath by Mr. Rogers for W. S. Besse of New Bedford were part of the collateral security given. According to some of the statements made, the barge New York, the last of the four which were described and illustrated in the Review a short time ago, has not been launched, for the reason that the owner and the transportation company fear that it would be attached immediately after the launch, for wages, supplies and other claims, which in the eyes of the law constitute prior liens upon vessel property. The petition was granted and a receiver appointed to take charge of the barge.

CLOSED UP WITH A RUSH.

IRON ORE BUSINESS OF 1899 SETTLED IN A SINGLE WEEK—PREMIUMS ON NEW SHIPS—PROSPERITY OF THE REAL KIND.

Without leaving their offices the iron ore sales agents of Cleveland have, in a single week, disposed of practically the entire output of Lake Superior mines for the coming year. This is a business that usually stretches over two or three months. The rush of furnace men to cover up their requirements, immediately following the announcement of prices, is such that the question with the ore companies has been how far can they go with sales and still keep within conservative estimates as to what they may expect in output from their mines. The ore business of the coming year is to be limited only by producing capacity. Thirty cents a ton advance over last year could have been secured as readily as the conservative 20-cent advance made by the ore companies. An immediate demand like that which exists at present for ore has never before been experienced in the trade. No satisfactory estimate can be made of the total output on account of the many elements of uncertainty that enter into calculations on this score. It may be that the production of 1899 will not be greatly in excess of the fourteen millions produced in 1898, on account of the labor question in the Lake Superior region and the demands upon railways, due to commercial expansion in other lines, but the business is certainly in sight if it is possible to care for it. This rush on the part of iron and steel manufacturers to cover up their requirements in ore relates particularly to what are known as old range ores, but the new Mesabi interests of Minnesota will, of course, share in the prosperity by a largely increased output, probably fully up to their producing capacity.

Unfortunately for the lake vessel owner, his business in ore for the coming year has been nearly all closed up on a basis of 60 cents per ton lake freight from the head of Lake Superior to Ohio ports, which was the rate of 1898. He covered too early. Some of the ore was taken at 55 cents on contracts running to Sept. 1. Now the vessel owner finds ship yards fully engaged until next fall and all of them figuring on new vessels that are not to come out until the spring of 1900. Modern steamers now on the stocks, contracted for at $200,000 to $220,000, would bring prices $20,000 to $30,000 above these figures if their owners were willing to transfer contracts. Such are the prosperous conditions on the lakes in sympathy with all other lines of commerce and industry, due to the disposition everywhere to make use of a great volume of money that has been lying idle for a long time past.

NEW GRAIN BILL OF LADING.

That the ship owners of the lakes are determined upon securing certain changes in the grain bill of lading, as outlined at the annual meeting in Detroit, was shown by another meeting in Cleveland Monday of officers of the association, members of the executive committee and members of the committee on grain bill of lading. There were present at this meeting Mr. F. J. Firth of Philadelphia, the new president of the association, Secretary Keep and Capt. J. J. H. Brown of Buffalo, Mr. A. B. Wolvin of Duluth, Mr. L. C. Waldo of Detroit and Cleveland members of the two committees. Everybody was delighted over the selection of Mr. Firth for the presidency. This was his first meeting with executive officers of the association. He is certainly a man of thorough experience in business affairs and a capable presiding officer. His knowledge of everything that has been undertaken by the Lake Carriers' Association for years past was surprising to members who did not know of his close relations with lake interests. He took up at this first meeting various subjects that will require his attention as president, and his views were entirely in accord with the other officials of the organization. His knowledge of how to undertake legislative matters in Washington will be of especial advantage to the association. On the matter of a new grain bill of lading his views also coincide with what has already been done and his relations with the line-boat interests will be valuable in this regard.

Changes proposed in the grain bill of lading at Detroit were again discussed at great length at this meeting and it was decided that a form of agreement involving the substance of these changes should first be submitted to all members of the association for their signatures. The vessel owners are to agree that they will abide by the action of their representatives in dealing with the grain interests at a meeting to be held in Buffalo about March 1. The Chicago and Duluth shippers of grain, Buffalo elevator managers, eastern receivers of the grain and other interests will be invited to this meeting, and they will find the representatives of the vessel owners ready to tell them what is wanted in the new bill of lading and ready also to make any reasonable concessions that may be warranted by an exchange of views at the proposed meeting. As now outlined, the substance of the new bill of lading will be about as follows: First, a clause limiting shortage to one-half bushel per thousand, about as provided by the flax seed bill of lading; second, an allowance of twenty-four hours in which to furnish an elevator at Buffalo, or demurrage based on a certain proportion of the vessel's freight to compensate for delay; third, a provision similar to the second clause, covering the loading of grain at upper lake ports; fourth, a clause making delivery to the party to whom consigned a good delivery. All this will be carefully worked out in the wording of the new form of contract, and there will be no misunderstanding as to the desires of the vessel owners when the Buffalo meeting is held. The association certainly has the power to carry these changes into effect, and a test of the strength of the organization will undoubtedly be made on this issue, unless an amicable agreement is reached at the Buffalo conference.

FASTEST IN THE WORLD.

CHINESE TORPEDO BOAT DESTROYER HAI LUNG, WHICH HOLDS THE SPEED RECORD OF THE WORLD—A PICTURE TAKEN WHEN THE VESSEL WAS MAKING 36.7 KNOTS PER HOUR—HER BUILDER, HERR F. SCHICHAU, OF ELBING, PRUSSIA, MAKES A STATEMENT TO THE REVIEW —NEW RUSSIAN YACHT.

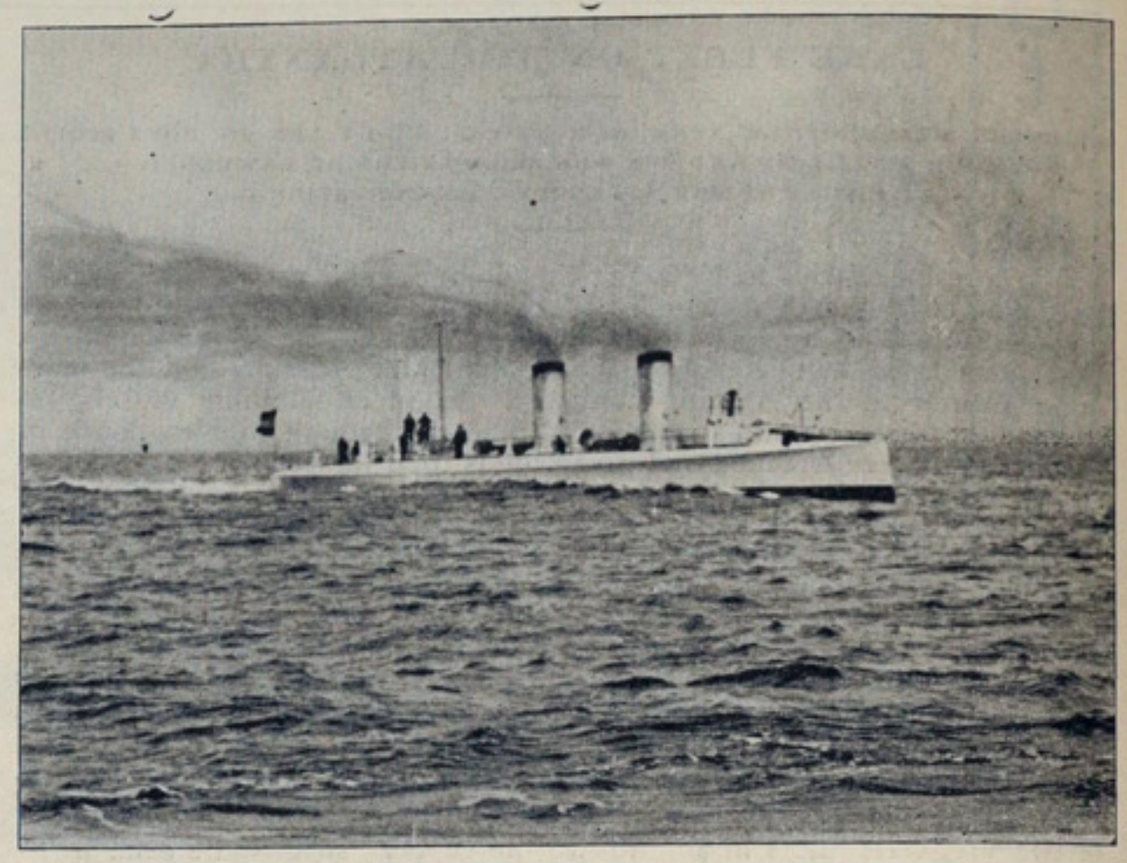
Through the courtesy of Herr F. Schichau, the well known ship builder of Elbing, Prussia, the Review is enabled to present herewith the first published picture of the torpedo boat destroyer Hai Lung, built for the Chinese government, and which on her trial exceeded by far any speed heretofore made on the water, surpassing even the best performance of the Turbinia. The picture is from a photograph taken when the vessel was making 36.7 knots or 42.26 statute miles.

Herr Schichau, in a communication to the Review regarding the Hai Lung and other torpedo boat destroyers built at his yard, which have made almost as creditable records, says: "With full trial-trip load these vessels ran a speed of over 35 knots an hour, over the distance between the light-house tower at Pillau and the light-house tower at Brusterort, a distance of about 18½ knots. The maximum speed attained during the trial-trip was 36.7 knots.

"The boats when at full speed made no bow wave and scarcely any smoke could be seen coming from their funnels. On the whole, all speeds have been easily obtained without any effort. These torpedo catchers proved their efficiency in the heaviest seas and the engines, which are of the approved Schichau out-balanced type, worked at all times very satisfactorily.

"The boats have a length of 60 metres and a displacement of 280 tons. The engines are capable of developing about 6,000 indicated horse power. With natural draft the boats made from 30 to 31 knots. Completely equipped with fully filled coal bunkers (67 tons of coal on board), and with a large supply of water for a radius of efficiency of about 5,000 sea miles, these boats with forced draught reached, during a trip of several hours, a mean speed of 33.6 knots per hour. The crew's quarters and cabins for the commander and officers are fitted up in the finest manner and furnished with every comfort. At present I am building twenty torpedo catchers of similar type, which have been ordered from me by different governments on the strength of the excellent results achieved by my 35-knot torpedo boat destroyers, built for the imperial Chinese government."

A very handsome vessel turned out during the past year at the Schichau works at Elbing is the twin screw yacht Faroslawna, built for the Russian Count A. D. Scheremetzew. The yacht is 144 feet on the water line, 21 feet beam and 7 feet 10 inches draught. The draught noted is when the vessel is fully equipped and with 35 tons of coal on board. The contract speed of the vessel was 15 knots, but on trial she attained with natural draught a speed of 16½ knots. She is fitted with two triple expansion engines of 1,000 horse power and two water tube boilers of 350 square metres heating surface. The vessel was built according to the high test Lloyd's rules of best soft steel. The whole internal arrangement is, as will be seen from the accompanying deck plans, of a most convenient character, and the cabins of the count and countess are very elaborately upholstered. All furniture and doors are mahogany polished, the walls are of bright polished wood, broad iron bedsteads and sleeping divans are provided, covers and curtains are of silk or velvet and the ceiling is done in white with beautiful ornamentation. The electrical plant is of the very best. The chart house on the deck forward is fitted also as a cabinet. The engines and boilers are of the Schichau torpedo-boat type and arrangements for forced draft are fitted but were not used on trial, as the boilers supplied sufficient steam to drive the engines at 240 revolutions per minute, giving, as stated above, a speed of 16½ knots where only 15 knots were required. Indeed a second trial demonstrated



TORPEDO BOAT DESTROYER HAI LUNG STEAMING 36.7 KNOTS.

that it was possible using only one boiler to drive the vessel at 14½ knots with natural draft. A trial of the seagoing qualities of the vessel was made against a rather stiff gale and heavy sea and the showing was entirely satisfactory.

It will be remembered, of course, that Herr Schichau completed, during 1898, the North German Lloyd steamship Kaiser Friedrich, a vessel of 12,000 tons and 25,000 indicated horse power which was both built and engined at the Elbing yard. The Schichau works were founded in 1837 and employ at the present time more than 6,000 workmen. The works have constructed to date 2,000 steam engines, 665 steamers for sea and river service; 240 torpedo boats and cruisers, with speeds from 20 to 36 knots per hour; 826 marine engines, including 500 triple expansion engines, aggregating 540,000 indicated horse power; and 50 dredgers of many different kinds.

Fig. 1.

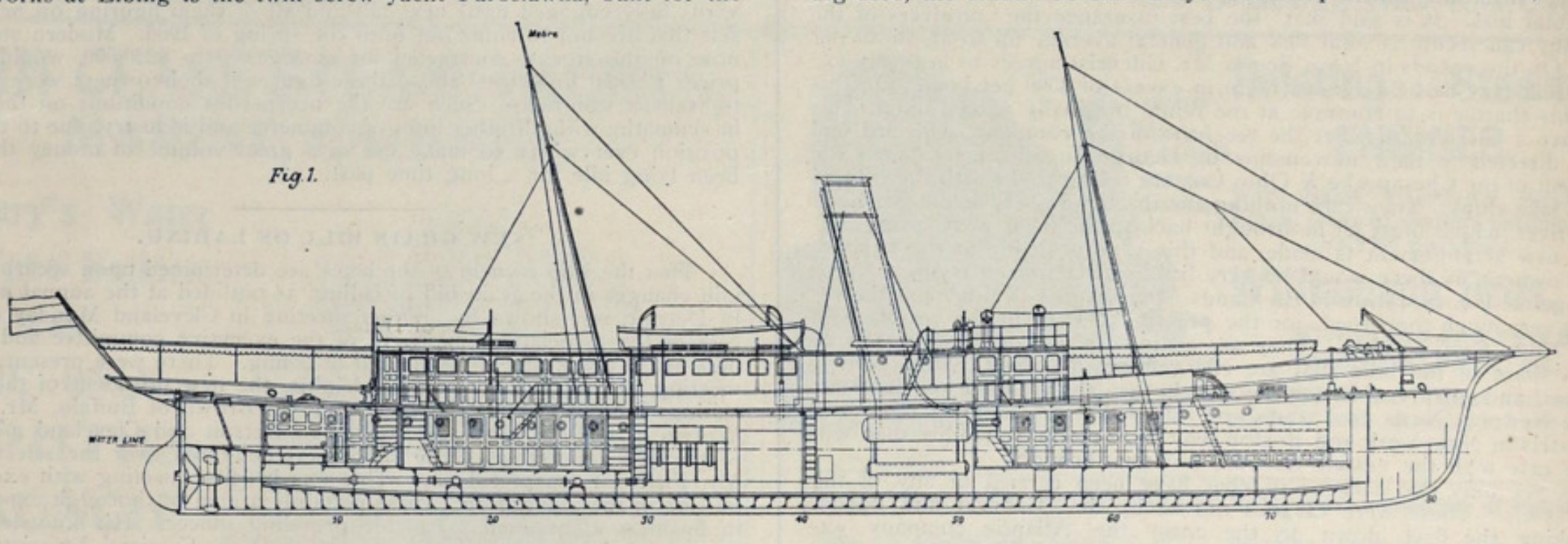


Fig. 2.

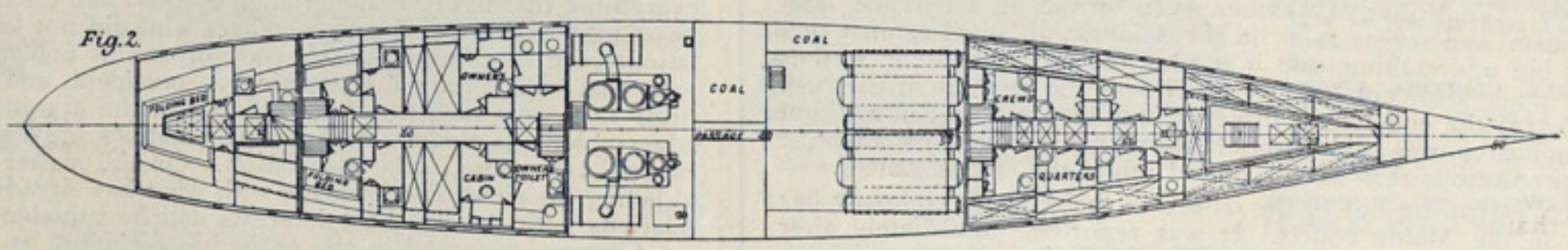
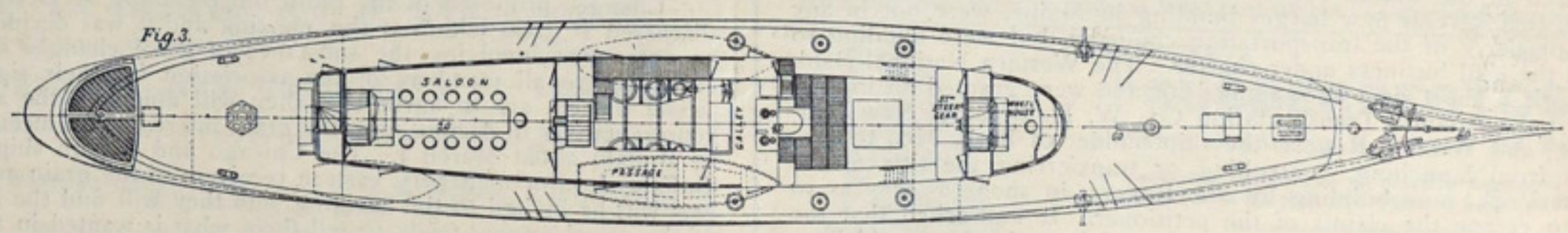


Fig. 3.



STEAM YACHT FAROSLAWNA, BUILT BY HERR F. SCHICHAU AT ELBING, PRUSSIA, FOR THE RUSSIAN COUNT A. D. SCHEREMETZEW.

The S. Freeman & Son Mfg. Co., Racine, Wis., were the lowest bidders for furnishing boilers and machinery for six steam fog signals at Waugoshance, Mich. Other bidders were the Ellicott Machine Co., Baltimore, Md., Thomson Kingsford, Oswego, N. Y., J. P. McGuire, Cleveland, and the Fulton Iron & Engine Works of Detroit, Mich.

SUPERVISING INSPECTORS.

REPORT OF THEIR ANNUAL MEETING AT WASHINGTON—A FEW OF THE IMPORTANT CHANGES MADE IN THE RULES.

Washington, D. C., Jan. 31.—The supervising inspectors of steam vessels from all parts of the United States, who have been in session here for several days past, are about to adjourn, but a full report of proceedings of the board will not be available until the official circular dealing with all changes in rules and regulations of the service is sent out from the office of the supervising inspector general. Manufacturers of boilers will be interested in a change in the second paragraph of section 2, rule 2, page 19 of the general rules and regulations. This paragraph as adopted a year ago was as follows: "All boilers built for marine purposes after July 1, 1898, shall be required to have all rivet holes in the shell fairly drilled, instead of punched, and the longitudinal laps of their cylindrical parts double-riveted, to be entitled to 20 percent additional pressure." It is now said that this rule was misunderstood, and the following amendment, which goes into effect at once, was adopted: "All boilers built for marine purposes shall be required to have the rivet holes in the shell, heads, steam and mud drums, and all other ports of the boiler (except for longitudinal and circumferential seams in flues for same, 20 inches outside diameter and under), fairly drilled instead of punched. Boilers to be entitled to the 20 percent additional pressure allowed by law must have the longitudinal laps of their cylindrical parts double riveted."

For a long time past there has been a difference of opinion on the great lakes as to whether a second-class pilot could stand a watch. On small slow-going steam vessels only one first-class pilot, with the captain, who is always a first-class pilot, has been required, as the captain of vessels of this kind is not so crowded for time that he can not stand watch all the time with the second mate. But on the large iron ore and grain carriers some of the local inspectors have insisted upon the employment of two first-class pilots in addition to the captain, so that the deck would never be without a first-class pilot. There has been little, if any, objection to this from owners, as they realize, in most cases, the importance of showing that they had a first-class pilot in charge of the deck in event of accident. It is understood, however, that at Buffalo and one or two other points large steam vessels have been allowed to sail with only one first-class pilot in addition to the captain, and now it is said that this practice has been sanctioned by the board. To the owners of the large vessels this seems strange, as some of them—the Bessemer Steamship Co., for instance—have gone so far as to employ as first mates in all cases men who have masters' papers.

After July 1 of this year masters and mates of sailing vessels of 700 tons and over will be required to have licenses and certain supervision otherwise will be extended to these vessels. A discussion was had regarding qualifications of these officers. Regulations regarding sailing vessels under the new law will be issued later. It was decided that hereafter lifeboat drills on passenger steamers, which are required once a week, must be noted in the log book.

Among members of the board present were the following: Capt. Burningham of San Francisco; W. R. Tibballs of Wisconsin; C. H. Wescott of Detroit; Capt. James Stone of Cleveland; George H. Starbuck of New York; R. J. Whitledge of St. Louis; E. L. Dorsey of Jeffersonville, Ind.; G. R. Crumbaugh of Hopkinsville, Ky.; John A. Carter of New Orleans; J. W. Oast of Virginia.

LOWERING OF LAKES HURON AND MICHIGAN.

Detroit, Mich., Jan. 31.—A very interesting part of the annual report of the board of managers of the Lake Carriers' Association, prepared by Secretary C. H. Keep of Buffalo, is the section dealing with lake levels. Mr. Geo. Y. Wisner of this city, a member of the United States board of engineers on deep waterways, has given a great deal of study to this subject. His attention was directed to that part of Mr. Keep's report which says that the lake levels for 1898 were, for Lake Superior, above the average for the past 12 years; Lakes Huron and Michigan, one foot below the level for the past twenty-eight years, and Lake Erie about holding her own, from which Mr. Keep concludes that the deepening of the channels has had nothing to do with existing conditions.

"It may be of interest to know," Mr. Wisner said, "that Lake Huron has been below its normal level for several years, and that the relative low water of that lake is due to a deepening which has taken place in the bed of the river at the rapids just below the foot of the lake. The government survey of 1867 shows the river at the narrowest point of the rapids to be 800 feet wide and 48 feet deep. At the same place the river is now 800 feet wide and 66 feet deep, making the area of cross-section of the gorge about twenty per cent larger than at the time of former survey. The effect of this deepening is, of course, to diminish the fall between Lake Huron and Lake Erie. An examination of the slope curves on plate 19 of Mr. Cooley's deep waterway report will show that the slope from Lake Huron to Lake Erie commenced to decrease in 1886, and it is probable that the excessive slope immediately preceding this date was the cause which started the scouring action resulting in the permanent lowering of the level of Lakes Huron and Michigan. It is possible that the improvement of the channels of the St. Clair and Detroit rivers may have played an important part in strengthening the current for any given slope, thereby producing scour in the bed of the river at the rapids. At any rate, whatever the cause, the deepening of the outlet has lowered the lake level for any given stage of the lake system far in excess of any possible effect that can be produced by the Chicago drainage canal when opened. This is one of the results of the investigations of the deep waterway engineer board relative to submitting a report on lake regulation."

The United States civil service commission announces that as the result of the examination scheduled to be held Feb. 7-8, 1899 for the position of assistant inspector of hull material, certification will be made to fill a position of the kind mentioned at the Homestead steel works, Pennsylvania, as well as at the works of Allen Wood Co., Conshohocken, Pa.

OUTLOOK FOR THE PACKAGE FREIGHTERS.

Buffalo, Jan. 31.—It might be difficult just now to say whether the owners of wild steamers or the managers of the package-freight liners were most hopeful of a satisfactory season. Last season the continuation of railroad wars kept the lines from recovering their lost ground in the way that the wild boats did. So the handling of flour by the lines fell off more than an eighth, while grain receipts increased about a twelfth.

The lake lines as such had but a single enemy on the water. That was the Canada Atlantic, which, in spite of a route that is not to be thought of in contrast with the Buffalo route, cut a most disagreeable figure in the traffic, especially west bound. It came out of New York by steamer up the Hudson, rail thence to Parry Sound via the St. Lawrence river, and again by lake. In order to make a record this line cut down the old rates, lake-and-rail, below the lake-and-canal rates, and fairly drove the old lines out of the west bound trade at times. At the best it made it impossible to carry anything at a profit. What its own losses were can merely be guessed at.

The Ogdensburg line was not an element of disturbance, as it undertook to maintain the general rates. Just how it will come into the new condition of things is not known, but its change of rail connection east from Ogdensburg is no expected to make any difference, as the same points are reached. It is likely that some effort will be made to obtain an understanding with the Canada Atlantic, but as yet the lines are engaged in settling up last season's business, which is said to be a matter of detail merely.

The only noteworthy change in the situation here last season was the retirement of the West Shore road from the lake trade on the claim that it did not pay. This cut off one of the connections of the Anchor line and confined it mainly to the Erie railroad. The New York Central line appears to gain something every season. It handled through its elevators here about one-fourth of the 217,000,000 bushels of grain brought in by lake, and with another steamer larger than any other on the lakes, it will certainly not do any less next season. Though a great disturber of grain rates of late years this line and road has not been called a bad cutter of package freight rates.

So it appears that about the same lines will be followed next season as last. Till the Wisconsin Central line owns its own boats there will always be some uncertainty before the season opens as to the make-up of the fleet. Flour ought to move in much more quantity than it did this season, for the lakes closed with scarcely any flour in store here, in place of the hundreds of thousand barrels that would have been laid down here if they could have been obtained at the close of navigation. There is now nothing to do but ship all-rail, a business that was always doubtful, and which is this winter a matter of the utmost guesswork. A shipment of flour on cars in Minneapolis may be here in eight days and it may take as many weeks. With the congested possibilites of modern railroading, not to mention the shortage of cars, now a common thing, it is a fact that water routes are faster than rail routes.

If it turns out that no ore carriers can live at 60-cent freights unless they can take 3,500 tons at a cargo, it may quite easily turn out that the package-freight trade will come out ahead the coming season.

OPERATIONS AT THE HERRESHOFF WORKS.

The Herreshoff Mfg. Co. of Bristol, R. I., has shipped to a prominent bronze manufacturing firm the pattern for the keel plate of the new yacht being built to defend the America's cup in the race with the yacht which Sir Thomas Lipton of Ireland will send to this country. In design, though not in length, the keel plate patterns are almost identical with those used for the Defender, which the Herreshoffs built for the last international race. The width of the plate will be 20 inches, the same as the old boat, and 28 or 30 feet in length—about 6 or 7 feet shorter than the Defender. The patterns, of course, demonstrate that the new vessel will not be of the "fin-keel" type.

The general countour of the Defender swelled out to a width of not less than 36 inches in the lead bulb, and the lead bulb of the new vessel will be even wider than the racer of 1895, and will consequently offer a much greater resistance to passage through the water. The length of the new keel plate shows also that the lead ballast is to be placed in one spot, rather than distributed as in the case of the Defender. Those who have seen the mould, figure from eye measure that it will shape out a lead bulb nearly 4 feet wide. The loss, however, is designed to be more than counterbalanced by the gain made in quickness of movement, both in stays and otherwise, while the yacht is expected to also gain by the cutting away forward.

The Herreshoff Co. has been making additions to its plant for some time past and has just completed a two story building, located directly opposite the machine shops and office. The building is 47 x 96 feet and very substantially built. The first floor will be used as a store room and the second floor as a sail loft.

NAVIES OF THE WORLD.

During a debate in congress, a few days since, a representative from one of the southern states presented an interesting table showing the relative naval strength (exclusive of vessels building) of the principal nations and which he said had been prepared from official sources. The table is as follows:

	Great Britain.	France.	Germany.	Russia.	United States.
Battleships	74	36	16	23	5
Coast defense	21	19	19	17	20
Cruisers	138	30	7	25	22
Gunboats	102	67	32	70	18
Destroyers	96	18	11	21	.....
Torpedo boats	190	250	142	215	12
Total	621	420	227	371	77

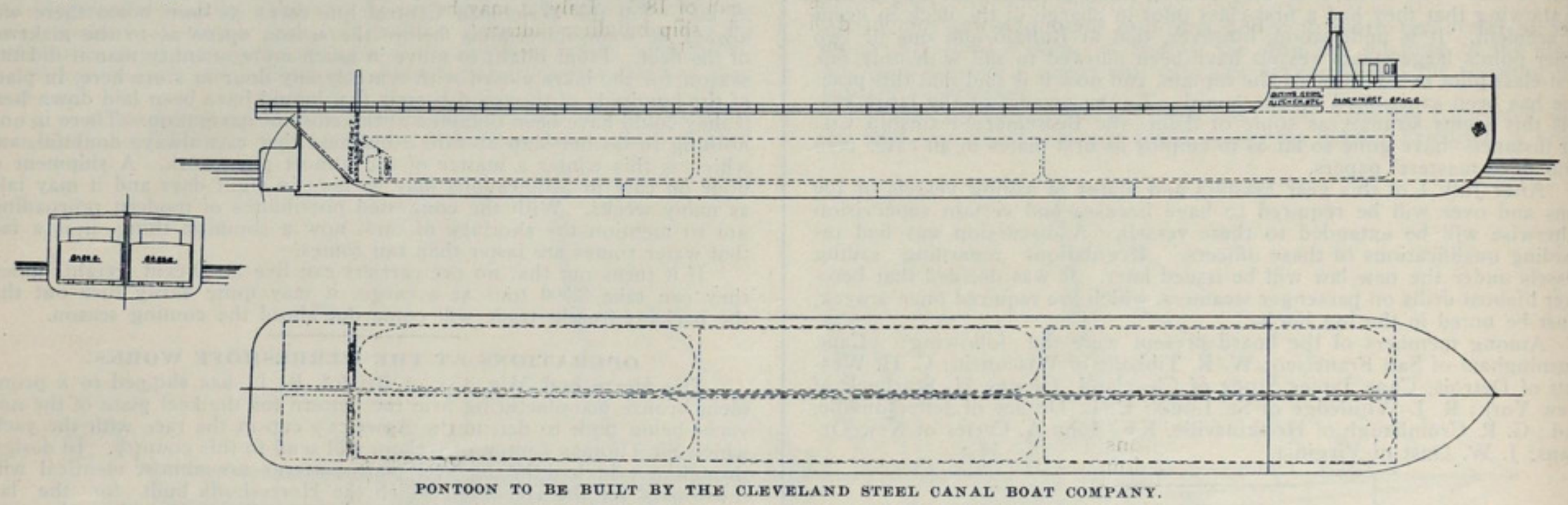
The Review is in need of issues of August 11 and Oct. 6, 1898, to complete files, and will pay a liberal price to anyone who may have these numbers to spare.

VESSEL TO CARRY CANALBOATS.

PONTOON BARGE, DESIGNED FOR THE LAKE ERIE SERVICE OF THE CLEVELAND STEEL CANALBOAT CO.—A MOST NOVEL CRAFT.

On the great lakes the car ferry has been developed to the highest degree of usefulness, not only for short runs in straits and rivers, but also for winter service over long stretches of open water, where heavy seas are encountered, and where it is found necessary at times to contend with ice of 2 feet or more in thickness. Here, too, the whaleback type of vessel, probably the most novel craft of the century, has flourished. Now another very novel craft, a pontoon barge to carry canalboats from Buffalo to Cleveland is to be built. The Cleveland Steel Canalboat Co., at a meeting held in Cleveland a few days ago, decided to build such a vessel upon recommendation of the general manager of the company, Mr. Chas. E. Wheeler.

A few years ago, the Cleveland Steel Canalboat Co. was organized, to operate a line of canal boats in through service between New York and Cleveland by the way of the Hudson river, Erie canal and Lake Erie. The undertaking proved successful and a large fleet of steel boats, some of them provided with steam power, has been engaged in the service, carrying sugar mostly on west-bound trips, and grain and flour to the east. An increase in this fleet of canalboats was desired, on account of additional business that was constantly developing. More steam vessels were especially desired, as the principal delays in the conduct of business mapped out for the fleet were encountered on Lake Erie. The canal boats—four or five of them together—made very poor headway against even moderate storms in the open lake between Buffalo and Cleveland, although they were among the best craft on the canal. More steam vessels would mean a dividing up of tows in the fleet of the canalboat company, and a general rearrangement of affairs of the company, that would probably involve additional operating expenses, but which would not insure a lessening of difficulties encountered on Lake Erie. In going over these features of the problem, Mr. Wheeler took up the idea of a pontoon type of barge in which to move the canal boats between Buffalo and Cleveland. The lake part of the route was short. The pontoon barge could be towed back and forth very rapidly, and more canal boats, especially the wooden boats, which are plentiful and which could be rented or purchased at low cost, could be brought into play. Mr. Wheeler secured a postponement of the proposition to build more small steel boats for his company. He was somewhat skeptical as to the feasibility of the pontoon project and he did not disclose his plans to the stockholders of the company until preliminary drawings had been submitted to several leading naval architects and engineers on the Atlantic coast and the great lakes. These experts were unanimous in declaring the scheme entirely practicable.



PONTOON TO BE BUILT BY THE CLEVELAND STEEL CANAL BOAT COMPANY.

An option for the construction of the vessel had been secured from the Union Dry Dock Co. of Buffalo, and it was expected that the contract would be let in time to insure completion about the opening of navigation next spring, but the canalboat company was slow in deciding the matter, and in the meantime the Buffalo ship yard, alike to all other lake yards, has been filled up with new work. Accordingly Mr. Wheeler has made a number of changes in the original plans and all lake builders will be invited later on to submit bids, with a view to having the contract placed some time during the coming summer and the completed vessel out by the opening of navigation in 1900.

In dimensions this barge will be 360 feet over all, 45 feet beam, and 24 feet depth, and structurally and in general appearance will be similar to the regular type of steel tow barge on the great lakes. Indeed the vessel will be so constructed that if it is at any time deemed advisable minor alterations will permit of her conversion into an ore carrier. She will, of course, have a double bottom and will also be provided with double sides for water ballast, so that in loading and unloading canal boats the operation will follow very closely that of a floating dry dock. As will be seen by reference to the accompanying plans, the vessel is designed to accommodate six canal boats, which will be floated into position while the boat is partly submerged, through an opening in the stern very similar to that in the end of a car ferry or a floating dry dock. When the canal boats are securely wedged in place the water will be pumped out, it being estimated that the operation will require not to exceed an hour's time.

The method of securing watertightness in the vessel consists of a rather novel arrangement, formed, as will be seen from a further reference to the drawing, by two huge doors, which insure double protection. One door is hinged at the bottom, while the other is unhinged and lifts perpendicularly. The type and capacity of pumps to be employed has not as yet been determined, but they will, of necessity, be quite powerful. It is expected that this vessel can readily be towed in almost any weather at the rate of nine miles an hour by any of the large lake tugs, whereas the speed of the canal steamers towing a fleet of canal boats does not exceed seven miles an hour and this without reference to the frequent delays on account of storms on Lake Erie. The specifications call for a steam steerer of the Queen City company's type, and a towing machine of American Ship Windlass make.

It is figured that the construction of this vessel, which will cost about $125,000, will increase the transportation facilities of the Cleveland Steel Canalboat Co. several times over. One estimate is that the company will, after the pontoon barge goes into commission, operate a fleet of seventy-two boats, and it is expected that the new vessel with six loaded canal boats, will make possibly three trips per week between Buffalo and Cleveland. There will, it is claimed, be no delay in the handling of cargoes, as six loaded canal boats will invariably be ready at each port to replace those discharged from the pontoon. Fifteen loaded canal boats will leave New York City each week. Operating expenses will also be reduced in other directions as a result of the construction of the new vessel. So says Mr. Wheeler in a talk outlining the plans of his company with reference to this new method of transportation.

COMPLIMENTS TO THE MARINE REVIEW.

The Review has to thank many friends, new and old, for handsome compliments bestowed upon our recently issued Ship Building edition, and to assure them of our sincere appreciation of the courtesies extended. We regret that the exigencies of space prevent us printing all these messages of congratulation and well-wishes. Our friends have found numerous ways in which to say pleasant things regarding the Review generally, and our most recent special issue in particular. A few selected at random will suffice to show the tone of the missives.

Senator William P. Frye writes from Washington: "Your edition of the Marine Review devoted to the shipping interests of the United States is a book of great value. It ought to be in the hands of every ship builder and owner in the country."

Commissioner of Navigation Eugene T. Chamberlain, also writing from Washington, says: "Please accept my thanks for the additional copy of the special ship building edition of the Marine Review, which I desired for the permanent files of the bureau. It presents a graphic story of the growth of the industry during the last year, which is most useful in illustrating and supplementing the bare statistics compiled by the government."

Mr. W. C. Sproul, vice president of the Delaware River Iron Ship Building & Engine Works (Roach ship yard), of Chester, Pa.: "You certainly deserve congratulation upon the splendid ship building edition of the Review which you issued last week. It was an excellent enterprise, thoroughly carried out, and we are gratified with the general attention and commendation your pains-taking and intelligent efforts have received."

Mr. Frank J. Firth of Philadelphia, president of the Lake Carriers' Association: "I went over your ship building edition with Mr. Clement A. Griscom, president of the American line, and we both pronounced it a work involving great labor and enterprise."

If the new work now planned for ship yards of the great lakes is covered by contracts, all the yards will be actively engaged until well into the summer of 1900. The Globe company of Cleveland will increase the length of the steamer Globe from 328 to 400 feet. The work is to begin immediately in one of the docks of the Ship Owners' company. The lengthening of several other steel steamers is contemplated, on account of the inability of ship owners to get new vessels. The Detroit Dry Dock Co. is going ahead with the work of putting triple expansion engines into the Corrigan barge Aurania. In addition to the new Rockefeller ships for 1900, on which the builders are figuring, it is understood that the Ann Arbor Railway Co., as well as the Flint & Pere Marquette, will send out specifications shortly for a new car ferry each.

Bids were opened, a few days ago, for the work of straightening and widening Buffalo river. Estimates based on the lowest bids submitted for the various sections of the work indicate that the aggregate cost will be $679,275, which is considerably less than was expected. The Donnelly Contracting Co. were lowest bidders for three sections of the work, and Brown, Stabell & Griffiths for one section.

Mr. Henry G. Morse of Wilmington, Del., writes the Review that nothing can be said for the present regarding the report circulated last week to the effect that he will establish a new ship yard near Baltimore with frontage on Chesapeake bay.

THE WORLD'S SHIP BUILDING.

INTERESTING RETURNS FOR THE YEAR JUST CLOSED COMPILED BY LLOYD'S REGISTER—THE UNITED STATES GIVEN RANK NEXT TO GREAT BRITAIN IN THE AMOUNT OF TONNAGE CONSTRUCTED—NEARLY A MILLION AND A HALF TONS NOW UNDER CONTRACT IN BRITISH YARDS.

The great activity in the ship building industry, both in this country and abroad, lends a particular interest to the summary of the returns for the year 1898, issued last week by Lloyd's Register of British and Foreign Shipping. The tables, which present the returns in detail, are preceded by a prefatory summary, which is in part as follows:

"During 1898, exclusive of war ships, 761 vessels of 1,367,570 tons gross (viz., 744 steamers of 1,363,318 tons and 17 sailing vessels of 4,252 tons) have been launched in the United Kingdom. The war ships launched at both government and private yards amount to forty-one of 191,555 tons displacement. The total output of the United Kingdom for the year has, therefore, been 802 vessels of 1,559,125 tons. The output of the year in the United Kingdom has surpassed all earlier records. In some previous returns of this kind, the figures for 1899 have been taken for comparative purposes as a rough approximation to the maximum productive capacity of the ship building yards of the United Kingdom. The fact that the output of that year has been exceeded by 158,000 tons as regards merchant vessels, and by upwards of 150,000 tons as regards war vessels, indicates alike the remarkable character of the year's work and the great resources of British ship builders. Comparing the present returns with those for the past two years, it will be seen that the tonnage launched in 1896 and 1897 was less by 208,000 tons and 415,000 tons, respectively, than that launched in 1898. Concurrently with this increased output of mercantile tonnage during 1898, the 1897 figures for war vessels have been doubled and those for 1896 have been exceeded by 28,000 tons.

"It is noteworthy, moreover, that the output of 1898 is, with inconsiderable exceptions, entirely composed of steam tonnage. In 1889, the record year alluded to above, 10 per cent. of the output was composed of sailing tonnage. For the four following years (1890 to 1893), the proportion rose to 19 per cent. Since that period, the construction of sailing vessels has rapidly declined, until in 1898 sailing tonnage has formed only 0.3 per cent. of the output. The past year has thus established a new record, not only as regards the total production, but also as regards the commercial effectiveness of the tonnage constructed. As regards the material employed for ship building purposes in 1898, it is found that 99 per cent. of the tonnage has been built of steel and 1 per cent. of iron. The iron tonnage is practically made up of trawlers, and comprises no vessel of more than 225 tons.

"Of the total output, 1,057,775 steam tons and 3,867 sailing tons, or 1,061,642 tons in all (nearly 78 per cent.) belong to ports in the United Kingdom. In this connection, it may be noted that the losses, etc., of the United Kingdom vessels during twelve months are shown by Lloyd's wreck returns to average 276,000 tons (194,000 steam, 82,000 sail). Sales to foreign and colonial owners for the twelve months ended October, 1898, reached the large total of 563,000 tons (426,000 steam, 137,000 sail). On the other hand, purchases from foreign and colonial owners during the same period amounted to 104,000 tons (100,000 steam, 4,000 sail). The sailing tonnage of the United Kingdom would thus appear to have decreased by about 211,000 tons, while the steam tonnage has increased by 538,000 tons. The net increase of United Kingdom tonnage during 1898 is therefore about 327,000 tons. This figure exceeds the similar estimates for 1895, 1896 and 1897 by 198,000 tons, 110,000 tons, and 279,000 tons respectively. Rather over 22 per cent. of the total output has been built to the order of foreign and colonial shipowners in 1898, as compared with 25 per cent. in 1897, 30 per cent. in 1896 and 20 per cent. in 1895. Denmark has this year provided the largest amount of work for British ship builders, twenty-two vessels of 44,691 tons (3.2 per cent. of the total output) having been built for that country. Norway follows closely with sixteen vessels of 44,338 tons. Next come Russia with 38,330 tons; Germany with 37,045 tons; and Japan with 30,191 tons.

LARGEST STEAMERS LAUNCHED IN UNITED KINGDOM.

"The largest steamers which have been launched in the United Kingdom during the year are the following: Afric, 11,850 gross tons; Medic, 11,850 gross tons; New England, 11,394 gross tons; Statendam, 10,475 gross tons; Omrah, 8,300 gross tons; Ultonia, 8,056 gross tons. Except the Inverclyde, of 1,634 gross tons, no sailing vessel of considerable size has been launched in 1898.

Of the principal ship building centers of the country, Sunderland takes the lead with an output of 258,754 tons. Then follow in order Glasgow (242,256 tons), Newcastle (238,551 tons), Greenock (149,049 tons), Middlesbro' (140,729 tons), Hartlepool (125,791 tons), and Belfast (119,526 tons). If, however, war ships be taken into account, the leading ports stand thus:—Glasgow (282,356 tons), Newcastle (273,961 tons), and Sunderland (258,754 tons). The returns for the year under review include 201 steam trawlers and other fishing vessels; twenty dredgers, barges, etc.; twenty-four yachts; thirty-six tugs; six vessels intended to carry oil in bulk; and other vessels designed for special service. Of the vessels launched in the United Kingdom, 654 of 1,131,237 tons have been built under Lloyd's inspection with a view to classification in the register.

"As regards the movements of the ship building industry during the course of 1898, these returns show that, irrespective of war ships, the total tonnage under construction in the United Kingdom on Dec. 31, 1898, exceeded by about 387,000 tons, or over 38 per cent, that under construction twelve months previously. The increase is entirely in steam tonnage, the sailing tonnage now in progress being quite insignificant. At the close of 1897, 1,013,319 tons (1,009,192 steam, 4,127 sail), were being built. These figures were themselves almost certainly without precedent in the history of the ship building industry. The returns for each succeeding quarter showed a further expansion of work, until at the present time no less than 1,401,087 tons (1,398,291 steam, 2,796 sail) are under construction in the United Kingdom. It should be added that the war ship tonnage being built in the country also reaches a higher total than any that has hitherto been recorded by Lloyd's register. Five years ago it stood at 95,000 tons displacement. In December, 1897, it reached 313,000 tons. Now it amounts to 410,000 tons.

UNITED STATES GIVEN SECOND PLACE.

"It appears that there have been built abroad, during the year, 371 steamers of 415,907 tons and 158 sailing vessels of 109,866 tons, in addition to fifty war vessels of 175,318 tons displacement. Among foreign countries, the three leading places are held by the United States of America (173,000 tons), Germany (153,000 tons), and France (67,000 tons). In the United States, a large warship tonnage (67,000 tons displacement) has also been launched during the year. Of the mercantile tonnage reported from that country, nearly half does not affect the general commerce of the world, being intended either for service on the great lakes or for local service on the Pacific coast. As showing the size of vessels employed on the great lakes, it may be mentioned that six steamers have been built for this trade during 1898 of upwards of 4,000 gross tons register each, besides five sailing barges over 3,000 gross tons each, two of the latter approximating to 5,000 tons. Germany has launched the Graf Waldersee, of 12,800 tons, and the Bulgaria, of 10,237 tons, besides five other steamers of more than 5,000 tons.

"In France, the construction of large sailing vessels, almost abandoned elsewhere, has continued to flourish under the influence of the bounties granted by the state. Twelve such vessels, of 2,000 tons and upwards, have been launched during the year under review. The largest of these, and likewise the largest seagoing sailing vessels built in the world during the year, are the Emile Siegfried and the Ernest Siegfried, of 3,214 tons each. Both have been built at Havre, under the supervision of Lloyd's register. No similar expansion is noticeable in the construction of steamers in France. In Italy, the mercantile output of the year has only been about 26,000 tons, but much larger figures may be anticipated in 1899. The returns of vessels now in progress, or contracted for, amount to about 90,000 tons, as compared with only 34,000 tons at the end of 1897. Italy, it may be noted, is another of the countries in which the ship building industry is affected by the operation of bounty laws.

"If to the figures from the several maritime countries above referred to, be added those for the United Kingdom, the total output of the world during 1898 (exclusive of war ships) appears to have been about 1,893,000 tons (1,779,000 steam, 114,000 sail). Lloyd's register wreck returns show that the tonnage of all nationalities totally lost, broken up, etc., in the course of twelve months amounts to about 733,000 tons (328,000 steam, 405,000 sail). It will thus be seen that, while the sailing tonnage of the world has been reduced by about 290,000 tons during 1898, the steam tonnage has increased by about 1,450,000 tons. The net increase of the world's mercantile tonnage is, therefore, 1,160,000 tons. Compared with this net increase for the world, the net increase of 327,000 tons, as stated above, for the United Kingdom is equivalent to 28 per cent. In the net increase of the world's steam tonnage, viz., 1,450,000 tons, the United Kingdom has shared to the extent of 538,000 tons, or 37 per cent. Of the new tonnage launched during 1898, the United Kingdom has acquired 56 per cent."

TELEPHONE EXTENSION TO LAKE SUPERIOR PORTS.

There is probably no one interest in the territory known as the Central West that has used the long distance telephone to the extent that the vessel interests of the great lakes have used it. Vessel owners and vessel brokers, as well as the ore and grain shippers, underwriters and others, talk back and forth over the lines between Chicago, Detroit, Buffalo, Cleveland and other leading cities almost as frequently, in some instances, as they use the local lines. Representatives of these interests will therefore be interested in the following interview with Mr. E. D. Trowbridge of Cleveland regarding the extension of the telephone system to Lake Superior ports:

"Detroit has fallen into line," says Mr. Trowbridge, "and that city will soon have a telephone system identical with the system in Cleveland. A large interest in the Michigan Telephone Co. has been purchased by C. J. Glidden and others, who own most of the stock in the Cleveland Telephone Co. In consequence the Michigan company's plant is to be improved and extended on a large scale, an eastern banking house having arranged to furnish whatever capital may be necessary up to $5,000,000. Detroit's exchanges are new, but since they were installed about three years ago the automatic signalling system, such as is in use in Cleveland, has been devised and has worked most successfully, so that the Detroit service will be greatly improved by the change. It is estimated that the automatic signalling system of switching calls has increased the capacity of subscribers' lines fully 50 per cent, to say nothing of the service being better in every way.

"The Michigan Telephone Co. will extend its toll lines to Alpena, Cheyboygan, St. Ignace, Mackinaw City, the Sault, Marquette, Houghton, etc. Work on these lines will be pushed and the Lake Superior ports will probably be in telephonic communication with Cleveland within three or four months. The Michigan company recently contracted for 30,000 cedar poles and 1,000,000 pounds of hard drawn copper wire, which will be used on this work. The circuits will be built of a large gauge wire, so as to give first-class service between upper and lower lake points. It is expected that before long the Long Distance company's line to Duluth will be completed. That, with extensions to be made by the Michigan company, will practically complete the telephone system so far as the vessel interests are concerned. The Bell company of Canada now has lines running from Toronto as far east as Quebec. It is probable that their service will be extended to some Canadian lake ports during the summer."

For a comfortable trip to New York take Pennsylvania No. 6, which leaves Union station daily at 1:40 p. m., and from Euclid avenue 1:50 p. m., arriving New York 7:43 next morning. Pullman's very best sleepers run through on this train without change. Supper is served in dining car. Note that the train stops at Euclid avenue station, saving the tedious ride down town to those living in the eastern part of the city. Phone main 1263 or east 513 for space and full information.

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A high place among the scientific institutions of this country must be assigned to the Franklin Institute of Philadelphia, and we gladly join the ranks of those who congratulate the institute on being seventy-five years old. Between 1824 and 1899 mechanical science has taken many long steps, and the library and the Journal files of the Franklin Institute are excellent archives. The changes by which the primative locomotives of Stephenson's time have evolved into the giants of today; the progress from Fulton's little steamboat to the splendid ocean steamers of our time; the demand for improvement which has called into being the telegraph, the ocean cable, the long-distance telephone; the movements in iron manufacture between the young manhood of Cooper and Hewitt and the great enterprises of our modern steel works,—on these and a hundred other points the Franklin Institute library yields information it would be difficult to find elsewhere. One who contrasts lake navigation as it was seventy-five years ago with the lake navigation of the present time, will admit that a great deal of history has been made in that period. The lake commerce of the first quarter of the century was slight and was carried on in the face of many disadvantages. Our lake ports were so small, and so lacking in the comforts of city life that it was hard to induce trained sailors to leave the coast and serve on our inland waters. During the war of 1812, our men-of-war on the lakes could not have been provided with crews but for the efforts of officers of unusual popularity, who persuaded some veterans to follow them. Here and there we find old citizens, whose fathers often told of the difficulties that beset Perry before he crossed the bar, and who remembered the exciting period when now the British, now the Americans, now the British, and now the Americans again were in command on Lake Ontario. The tonnage of the combined war fleets of those days could easily be stowed under the hatches of a fraction of the vessels that, now move along the lakes bent on the peaceful errands of commerce. If we were to compare the size of lake vessels, the mode of hoisting freight, the system of storing it, the fauna and flora of the lake shore, the methods pursued in the lumber and mining industries as they were in the year of the founding of Franklin Institute with their counterparts of today, we would find abundant proof that the world had changed.

Everybody who owns a ship knows the law in this country which limits the liability of the ship owner for damage done by the ship to the value of the ship. This law is of great advantage to the ship owner, but there are many sound arguments in favor of it. Since the passage of this law several years ago ,the admiralty courts have been called upon to deal with cases of damage inflicted by vessels in port, and they have held in at least one important case now called to mind—a case in the circuit court of appeals—that the law does not apply where the claim for damages was one that arose on land. The law would not apply, for instance, if a vessel struck a dock and destroyed the dock or property on the dock. A bill has been introduced in congress that aims to have this law extend to injuries by a vessel to persons or property on land. The measure is in charge of Mr. S. S. Barney, a member from Milwaukee. Mr. Barney's intentions are very good, but it is not probable that the bill will be urged by the vessel interests. It would invite discussion that might not prove advantageous to vessel owners, and it is the general opinion that the matter of damage done by a vessel to property on land may be sufficiently well handled in the interest of the vessel if the petition is filed in a common law court having competent jurisdiction.

It was, of course, expected that the free ship advocates in congress would make a political measure of the Hanna-Payne shipping bill and would take occasion to enter into a severe personal arraignment of the measure, through a minority report, when the bill was reported to the house from the committee on merchant marine and fisheries. There is certainly nothing to be gained by referring to representatives of the shipping interests of the country as "mere bounty beggars." There is no argument but a great deal of offensive language in the minority report on this bill, submitted to the house Tuesday. The aim of the free ship representatives is carefully buried in one sentence near the close of the minority report: "Every American citizen," says the report, "should be free to buy ships to use in the foreign carrying trade wherever he can find them cheapest and best. Tonnage taxes should be abolished."

As noted in the annual report of the Lake Carriers' board of managers, the association is giving attention to the progress of work on the power canal at Sault Ste Marie and will act with the engineers of the war department to prevent the use of water from Lake Superior in this private waterway until the shipping interests are fully satisfied that there will be no lowering of water in St. Mary's Falls ship-canal due to the power channel. It is understood that investigation of this matter has been entrusted by the war department to a board of engineers consisting of Major Symons of Buffalo, Major Raymond of Philadelphia and Col. Lydecker of Detroit.

Negotiations are under way looking to the speedy resumption of work at the plant of the Hillman Ship & Engine Building Co. at Philadelphia. The company, it will be remembered, assigned after the death of President Hillman, a short time ago. Three vessels are under construction at the works—a tug for the Staples Coal Co. and a steamer and barge for the American Gold Dredging Co.

COMMODORE MELVILLE ON WATER TUBE BOILERS.

FOR WAR VESSELS, HE SAYS THE CYLINDRICAL BOILER IS NOW AS DEFINITELY ABANDONED AS THE COMPOUND ENGINE—WHY THE UNITED STATES NAVY HESITATED ABOUT THEIR ADOPTION OF THE WATER TUBE GENERATOR.

The fact that Commodore George W. Melville, engineer-in-chief of the United States navy, has always been an earnest advocate of the installation of water tube boilers in naval vessels has induced in many persons a certain degree of wonderment that after having seemingly demonstrated the soundness of his theories by introducing water tube boilers in connection with cylindrical boilers in the monitor Monterey he should not have followed it up by the adoption of this type of boiler for the battleships and other vessels then building, or about to be contracted for. Heretofore the engineer-in-chief has vouchsafed no special explanation of his reservation of the final mark of approval. Commodore Melville refers to this matter now in the first of a series of articles which he contributes to the Engineering Magazine. He says in part:

"The growth of the factor which has caused the latest revolution in marine engineering—namely, the use of the water tube boiler—has been very rapid in recent years. Water tube boilers in some form are very old, not only on land but at sea. Their use for large powers, however, is of recent date, and the United States may claim the earliest use of a large amount of power in water tube boilers at sea—in the coast defense vessel, the Monterey, in which such boilers, built by Mr. Charles Ward, for 4,800 indicated horse power, were installed in 1891. Boilers of this type had been used in the French navy for some years before this, but not for very large powers. For torpedo boats water tube boilers had for some time been extensively used, and not very long afterward they entirely displaced the locomotive type. In France water tube boilers of various types have entirely displaced the cylindrical boiler within the last few years, and the same is true of the English navy.

"In the United States navy, after the installation on the Monterey, little was done until recently toward extending their use on ships of any size, and I trust I may be pardoned for a brief word of explanation in this connection, as my position in the matter may not have been thoroughly understood. The merits of the water tube boiler have been so thoroughly set forth that I need say only that, when these boilers were placed in the Monterey, I was fully aware of their advantages, but in the building of the navy the United States were in a different position from that of other countries. England and France, which were introducing the water tube boiler so rapidly for large vessels, were adding to powerful fleets already in existence. The United States were building battleships for the first time, and I felt that, with all its advantages, there were certain disadvantages of the water tube boiler which made it undesirable to adopt anything of an experimental nature in these few battleships, until the unqualified success of the new type of boiler had been demonstrated. In my annual report of last year to the secretary of the navy, I stated that, in my judgment, the time had arrived when it was perfectly safe to use water tube boilers exclusively in all classes of vessels. At that time, besides the Monterey and all torpedo boats, water tube boilers were in use on the Nashville, Marietta and Annapolis, and were being installed on the Chicago and Atlanta. Since that time all the designs from the bureau of steam engineering have been for water tube boilers, and I consider that for war vessels the cylindrical boiler is now as definitely abandoned as the compound engine.

"A word in passing may be given to some of the special advantages which water tube boilers present for naval purposes. One is the great tactical advantage, which was very thoroughly brought out by the conditions of the blockade at Santiago—namely, the quickness with which steam may safely be raised. In large cylindrical boilers steam can be raised from cold water in about three hours, but this is almost sure to injure the boilers by the unequal expansion. In water tube boilers steam can be raised with perfect safety in half an hour or less, depending upon the size and type. To maintain vessels in readiness for instant use with cylindrical boilers, fires must be kept in all the boilers, involving a large expenditure of coal, which in some of the ships on the Santiago blockade amounted to as much as thirty-five tons per day. With water tube boilers this would not be necessary; a much smaller coal expenditure would suffice.

"Another great advantage of water tube boilers is the facility with which extensive repairs can be carried out without serious disturbance to the hull of the vessel. The Monterey's boilers were practically rebuilt a little more than a year ago by the force on board, without any change in the structure of the ship whatever. The most notable instance, however, occurred last summer, when three of the old monitors, built during the war of '61-'65, had their old box boilers cut up and removed and new water tube boilers installed. The pieces of the old boilers were passed out and the parts of the new boilers (Babcock & Wilcox type) were passed in through the smoke-pipe opening and assembled in place. Had any other than a water tube boiler been put in, it would have been necessary to take up the whole deck over the boilers, and thus greatly delay the entrance of the vessel into service, wheras the water tube boilers were in place and ready for steam in about thirty days after the contract for their building was placed."

John Irving, Victoria, B. C., ship builder, is authority for the statement that the little side-wheel steamer Willie Irving, which he built and which was the first steamer to run on the upper Yukon, aggregated in gross receipts during four months' service last year, $127,668. She made ten trips between June 27 and Oct. 26, and on one of the round trips made $23,000. It is claimed that on one occasion the boat shot the Five Finger rapids, two miles in length, in 2½ minutes.

The new Hamburg-American Line screw steamship Deutschland, now building, will have four smokestacks and two pole masts. She will be 687 feet in length, 66 feet beam, 42 feet deep. She will be of 16,000 tons, 33,000 horse power, and is expected to make 23 knots average speed. The best average time made by the Kaiser Wilhelm der Grosse, the fastest merchant ship now afloat, was 22.35 knots, for a voyage of 3,055 nautical miles.

SHIP BUILDING SUPREMACY.

AMERICA IS SOON TO GET ALONGSIDE GREAT BRITAIN IN THE RACE—REMARKABLE ADMISSIONS FROM THE GREATEST OF TECHNICAL PUBLICATIONS, ENGINEERING OF LONDON.

In recent issues we have published reports of the meeting of the American Society of Naval Architects and Marine Engineers, held in November last in New York. Apart from their professional value the proceedings are full of interest for British ship builders, and, indeed, for the whole British nation. Looking back one can hardly believe it is only five years since the first meeting of the society was held, so much has been done, and so greatly has the society increased in importance during its brief existence. There is no mistaking the significance of the fact. A society such as this could not be called into being and flourish immediately unless people were very much in earnest about the object for which it is established. The plain English of this is that the Americans mean coming to the front in the ship building and marine engineering trades, and intend putting themselves once again on their old footing of our chief rivals in the production of ships. How far they will succeed, of course, remains to be seen, but we think even the most patriotic, dogmatic and insular veteran of the Clyde or Tyne (and there are some fairly positive persons on the banks of both rivers), will hardly conclude that the competition will be altogether insignificant if he consider the facts of the case.

In the first place, the war with Spain, and the subsequent expansion of the states as a colonising country, has stirred the pulse of the American people in a remarkable manner. The writings of Capt. Mahan, which have done so much for us, have likewise opened the eyes of Americans. They see now that had they been as they were ten or twelve years ago in regard to their navy, the outcome of the late war might have been very different. Even as it was there was a good deal of alarm felt. The average American citizens did not know at the beginning—as Admiral Cervera knew—in what a rotten state the whole Spanish navy was, and they may be excused, especially if living near the coast, for feeling uneasiness as to what might transpire. At any rate, the Americans, who began to rouse themselves in naval matters a dozen years ago are now fully awake. They have determined to stand in the front rank as a sea power, and they are, in accordance with their general policy, resolved to make all their ships, engines, guns and armor plates themselves. Anyone who knows anything of the United States and its people knows that this determination will be carried out.

That is one point; another is that the Americans are quite shrewd enough to see that a big and strong war navy can hardly exist excepting on the foundation of a big and prosperous mercantile marine. That is an axiom that has been recognized in all times; and yet we, in England, so far as personnel is concerned, are acting as if such a law did not exist. We may, therefore, perhaps take it for granted that the United States is going to do its very best to foster an industry in the building of ocean-going ships; but the crucial point is, What is their chance of success? Now, ship building and marine engineering, like most other manufactures, depends on other industries, notably on iron and steel production. Without a cheap and ample supply of native raw material, America could never be a serious rival to this country in ship building. There is no need to elaborate this point. A dozen years ago it might have been excusable for us to treat American competition in ship building as a dream not likely to be fulfilled until, at any rate, a remote period. But since then the American iron and steel makers have advanced at such a prodigious rate that they can put at the disposal of the ship builder the great staple of the industry, mild steel, often at a cheaper rate than we in England can buy it. To what causes this is to be attributed it would take us too far afield now to discuss. We simply take it as a concrete fact that has to be dealt with. Naturally some time must pass before America can get alongside us in this race for ship building supremacy; but events move with marvellous celerity in these days of rapid and universal intercommunication among nations. The migration of industries is a feature of modern life that has acquired immense significance of late years. Every steamship built, every railway opened, every telegraph cable laid, every technical journal established, adds to the facilities for gaining information where, in all the world, things are best to be bought, and enables buyers to visit those places. If ever Philadelphia, New York or San Francisco arrive at the point of building ships cheaper than they can be built in the United Kingdom, it will not be long before buyers run over to see what those ships are like.

The fact that the ship building industry, in common with so many other branches of engineering manufacture, has at the present time such glowing prospects, will naturally help America in her praiseworthy endeavor to make her own ships to carry her own produce; and also to make as many ships for other nations as she can get orders for. At the present time all iron and steel makers and engineers in general, are in the very hey-day of anticipation. No doubt the prospects of opening out the erstwhile closed places of the peopled globe are stronger now than they have been for years past, indeed they have never been so promising before. It is, however, one of the most difficult things to forecast the future progress of trade. We hear now that the "boom" is no "boom;" it is a healthy expansion and will go on indefinitely. To those who have good memories and use them, these sanguine forecasts will have something of the ring of old times, and it really seems too good to be true that the ebb and flow of industry is past forever, and that we are to have in future nothing but a smiling full tide of prosperity. Sanguine forecasts engender others with such remarkable fecundity that it is wise to consider in time. "Never was business so good," says one man to half a dozen others; and the half dozen repeat it to a dozen each, and these in turn to other dozens. It never does not to know; besides, it appears as if one were not sufficiently up to the mark to get one's share of good things. Moreover, the role of Cassandra is always an unpopular one.

Making all allowances, however, there is a "flush time" ahead—unless the political gentlemen upset it all for us—and this will be the American ship builder's opportunity. We all remember how it was before 1883, when a ship buyer had to go into a ship builder's office in a very humble manner, and if that comes about again a good many buyers will go to America. Fresh yards will be opened, experience will be gained, and if the "boom" after all turns out to be only a "boom," these yards will have to be dealt with during the lean years to follow.

Of course the new competition, if it is to come, is inevitable. We can no more stop it than Canute could prevent the waves wetting his toes on a rising tide; but perhaps some of us have not the same prescience as the Danish king. The one way to defeat foreign competition in ship construction, would be for builders to bring their prices down to such a narrow margin of profit that it would not pay any one else to cut in; but even then if we take the latter seventies and early eighties as an example, we should have to lay down more slips and engine shops. It is not very likely, with a flowing tide of demand, that builders will practice this self-denying ordinance and abandon immediate individual gain for prospective advantage to the community. And even if they did it is doubtful whether the desired advantage would accrue. To stifle competition by such a dog-in-the-manger policy might appear advantageous at first, but such efforts to check the legitimate expansion of industry seldom succeed in the end and most often recoil on the heads of the originators.

The economic possibilities opened up by the prospect of the United States once more assuming its old position as our great rival in the shipping industry are, of course, incalculable. We, in England, have been apt to think there was nothing to fear in foreign markets from a protectionist country such as America. Without entering upon debatable ground we may say that, as a matter of fact, the illusion has been dispelled. From an economic point of view, however, we may look forward with less appreciation to American rivalry than to that of any other country. Competition will stimulate invention and enterprise, and we had better have, in time, one rival to arouse us from the stagnation that invariably follows monopoly—whether of individuals or nations—than half a dozen later, when bad habits have become confirmed. The improvements and advances that are sure to follow competition will bring more of ease and enjoyment to all classes; more leisure and more enlightenment. That is an economic fact that can hardly be doubted, but which will bring small consolation to the British ship builder when he looks back to the halcyon days of his supremacy. Moreover, the world was not made for the British ship builder, however much the world may owe him in the past for leading the way in international communication.

Considerations such as these denote the importance of the proceedings of the American Society of Naval Architects and Marine Engineers to British ship builders and engineers. The American Society is founded on the model of our own Institution of Naval Architects, which, in spite of the exclusiveness of its title, is almost as much a marine engineering society as one of ship constructors. Our own institution has been the mainstay of the ship building and marine engineering business of this country. It has been the means of bringing together members of both professions, of making those known to each other who otherwise would never have met, of introducing a spirit of camaraderie that has been most fruitful of interchange of opinion and mutual help. Of course the reading of papers and discussions on technical subjects has been the chief means of spreading abroad knowledge, and here English speaking, or, rather, English reading, citizens of all countries have profited in common with ourselves. That is a great international work which the Institution of Naval Architects may justly feel proud of having carried out for over thirty years; who shall say to what increase in the comfort and happiness of mankind?

The American Society is worthily following in the footsteps of its prototype, and perhaps there is no more striking proof of the similarity in character of the two great English speaking nations than the way in which technical institutions, modelled on identical principles, flourish in both countries. The prevailing note on each side of the Atlantic is openness. That is chiefly the result of technical institutions. We all know how British steel makers go to the United States and are told and shown everything down to details and percentages. We believe the American steel makers say the same of their British competitors; though, doubtless, the United States ironmasters, having a more recently established industry, have more to show us now than we have to show them; just as we had most, in fact, almost everything, to teach them in the past.

So, doubtless, it will be with the ship building industry. In the navigation of the great fresh water seas, and in the coasting traffic, both strictly protected, American ingenuity and fearlessness of design has been conspicuous, and in certain respects have afforded models on which we have moulded some of our own practice. At present American builders of ocean-going vessels will, doubtless, be content first to assimilate British practice, but no one can doubt that the well known genius of the people will lead to modifications and improvements by which we in turn shall profit. In any case, when international competition in ship building comes—as come it must—it will be a good thing to know that our keenest rivals are a people closely related to ourselves in blood, of like characteristics and ways of thought, and with sympathies so closely entwined. Year by year with increasing knowledge the two nations are being brought closer together, and we may feel assured that the strong American navy which must form the complement of an extensive mercantile marine, will not be likely to be turned against our own fleet; that the two flags will float side by side, supporting each other as emblems of justice and goodwill to all people. That we hope is not a wish too Utopian to be fulfilled.—Engineering of London.

MERCHANT MARINE OF SWEDEN.

Sweden is the latest country to undertake the upbuilding of its merchant marine. According to recently compiled statistics that nation now stands ninth in the rank of maritime nations with reference to the total carrying capacity of its merchant navy, its aggregate tonnage being given as 552,785 tons. Since Jan. 1, 1896, the increase in tonnage has amounted to fully 175,000 tons. The improvement of conditions is well evidenced by the fact that whereas the increase in 1896 amounted to 40,000 tons and in 1897 to 55,000 tons, the aggregate in 1898 was in the neighborhood of 80,000 tons. Formerly almost all Swedish vessels were built in Great Britain, but of late years the ship builders of Germany and Denmark have secured a very fair share of the work. However, much of the increase of both the Swedish and Norwegian merchant fleets is due to the purchase of British second-hand tonnage, which it is claimed is, in many cases, even more suitable for the Swedish and Norwegian shipping trade than new vessels.

EDISON ON SKIN FRICTION.

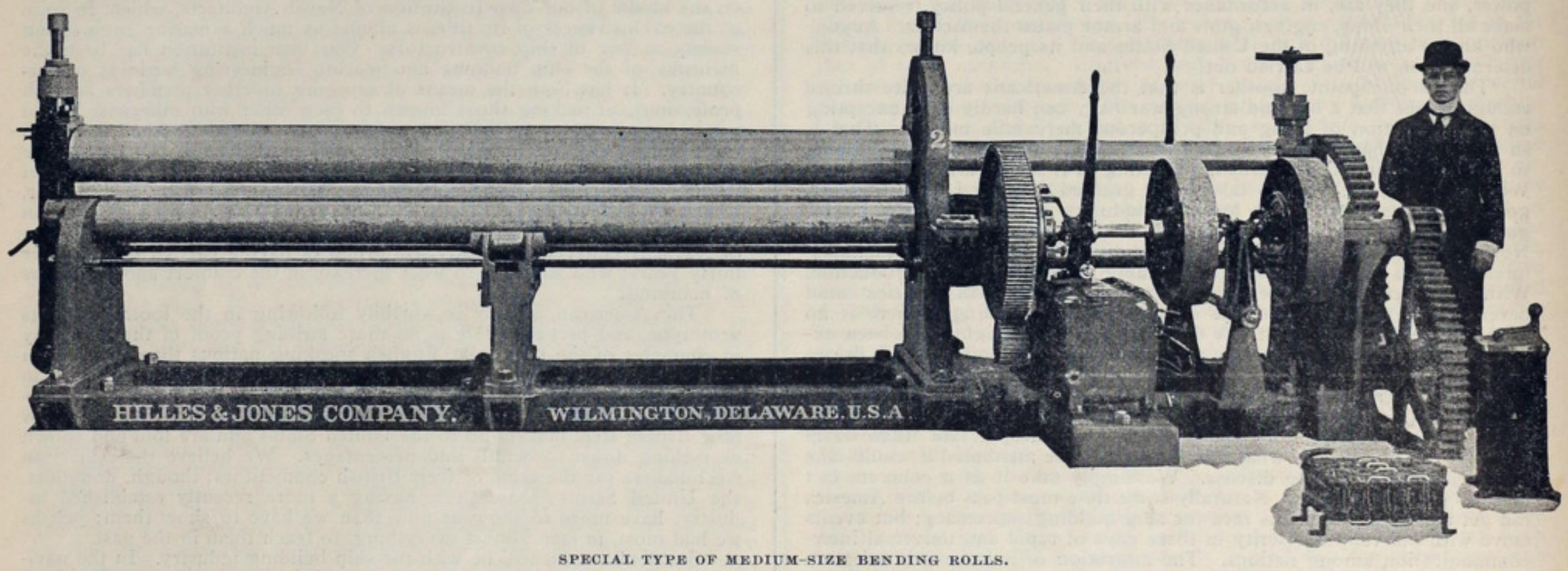
Thomas A. Edison, the great inventor is accredited in a recent interview with some interesting remarks relative to skin friction of ships. In part he says:

"It is now simply a question of reducing the friction between the sides of the ship and the water. I have been experimenting in this direction. What makes the resistance which the screw must overcome is the fact that the ship drags a lot of water with her. To illustrate this, say the vessel is going 20 miles an hour; 2 feet from her side the water is going ten miles an hour, 4 feet away five miles an hour, 8 feet away two miles an hour, 9 feet off one mile an hour, and so on in diminishing ratio. All this water the vessel is dragging with her. That is what the engine has got to do—not force the ship through the water, but carry the water along. This all comes from the fact that the water sticks, as it were, to the sides of the ship.

"In my experiments I sought to produce hydrogen by electricity along the sides of the ship, eliminating the salt in the water. After a long series of experiments, I succeeded, and, using a current through the sides of the ship, reduced the friction of the water to a minimum. I thought I had one of the biggest things of the century till I tried it in genuine salt water. I had been making my salt water in the tank by emptying salt into fresh water. I got four barrels of salt water from Sandy Hook and found that with it my invention would not work, because the ocean contains other things than salt. I am confident, however, that success lies in this direction. Had I been able to apply my invention successfully to the Campania, she could cross easily in four days. It could not be done, however, with the natural salt water, according to the method I used. Further experiments may open the road to success. The same result may be achieved by forcing some cheap oil through the pores of the sides of the ship under the water line. She would slip across the ocean on a bed of oil like greased lightning."

NEW DESIGN OF BENDING ROLLS.

A new design of medium-size bending rolls, recently gotten out by the Hilles & Jones Co. of Wilmington, Del., is illustrated on this page. These rolls are intended for bending plates to very small diameters, and are especially useful on such work as masts, small flues, pipes, etc. The bottom rolls are kept as close together as possible, to avoid a flat on the ends of the plate, and they are also provided with a center support. The general features of the Wilmington company's standard plate bending rolls, such as counterbalancing of the top roll, hinged housing, substantial bed plate under entire machine, etc., are also carried out. One of the special points in relation to this machine is the method of driving. It will be noticed that there is an enclosed electric motor mounted on the bed plate and driving on to the pulley shaft through a pair of cut gears and a friction clutch. In addition to this there is a pair of duplex friction clutch pulleys, so that the machine can be either electrically driven or belt driven. The friction clutch, which is connected with the spur wheel driven by the motor, can be thrown out to avoid revolving the armature of the motor when the machine is being driven by belt. The motions of the machine are controlled by levers in convenient positions, and it is a substantial, well-designed tool for the class of service for which it is intended.



SPECIAL TYPE OF MEDIUM-SIZE BENDING ROLLS.

Reports regarding big iron production and stocks on hand indicate very clearly the prosperous condition of the iron industry. Complete returns to the American Iron & Steel Association show a total production in 1898 of 11,773,934 gross tons of pig iron of all kinds, against 9,652,680 tons in 1897, an increase of 2,121,254 tons, or very nearly 22 per cent.; production of Bessemer pig iron in 1898, 7,337,380 tons, against 5,795,584 tons in 1897, an increase of 1,541,800 tons; production of basic pig iron, 785,444 tons, against 556,391 tons in 1897, an increase of 229,053 tons; production of charcoal pig iron, 296,750 tons, against 255,211 tons in 1897 and 310,244 tons in 1896. Stocks of pig iron unsold on Dec. 31, 1898, amounted to 291,233 gross tons, against 571,577 tons on June 30, 1898, and 656,489 tons on Dec. 31, 1897. The unsold stocks at the close of 1898 were 2.4 per cent. of the total pig iron production of the year. This was the lowest percentage of unsold stocks ever recorded at the close of any year in the last twenty-five years.

The American Association of Manufacturers in annual convention at Cincinnati advocated by resolution the building of the Nicaragua canal and indorsed the Hanna-Payne shipping bill.

A BATCH OF NEW CONTRACTS.

George H. Hutchings of Hoquiam, Wash., has begun work on four-masted schooner for the E. K. Wood Lumber Co. of 10 California street, San Francisco, Cal. The vessel will be 193 feet over all, 38½ feet beam and 14 feet depth and will cost $38,000. Mr. Hitchings, who has succeeded to the management of the yard formerly operated by P. Matthews, writes the Review that he expects to close a contract within a few days, for the construction of a duplicate of this vessel.

T. S. Marvel & Co., Newburgh, N. Y., have begun work on a smal' passenger steamer to be known as the City of Ossining for Capt. Jenks of Sing Sing, N. Y. The boat, which will replace the Lewis D. Black on the route between Sing Sing, Haverstraw, Nyack and Rochland Lake, will be 90 feet long, 25 feet beam and 8 feet depth of hold. She will be fitted with fore-and-aft compound engines and steam will be supplied from a Roberts water tube boiler.

The Maryland Steel Co., Sparrow's Point, Md., has just closed a contract with the Boston Towboat Co. for a single-screw steel steamer, which has been spoken of as the second American "tramp." She will be 325 feet in length, 47 feet beam and 27 feet depth of hold; of 2,500 tons net or 3,000 tons gross register, and will have a carrying capacity of about 4,500 tons of coal. The contract calls for her completion next October.

William McKie of East Boston, Mass., are building a ferryboat for the Boston, Revere Beach & Lynn Railroad Co. The new vessel will be 142 feet in length, 47 feet beam and 12 feet deep and will be radically different in many respects from the ferry boat Noodle Island, recently launched at the McKie yard. The contract calls for completion by May 24.

Davis & Son of Kingston, Ont., will build a tug for towing service in connection with Dominion government improvements. She will be 60 feet in length by 14 feet beam. Davis & Son will also build a 110-foot steamer for Lake Champlain service, and they are figuring on a passenger steamer for C. W. McCoole of Pembroke, Ont.

The Long Island Machine & Marine Construction Co. of Long Island City, N. Y., has resumed operations with an increased force of men. The principal business in which the company is engaged is the construction of tugboat engines.

The Pusey & Jones Co., Wilmington, Del., has secured from William Hester, the Brooklyn newspaper publisher, a contract for the construction of a steel steam yacht 128 feet in length.

The Great Northern Transit Co. of Collingwood, Ont., is said to have decided upon the construction of a modern steamer to replace the Pacific on the Sault Ste. Marie route.

The five-masted wooden schooner building by Percy & Small, Bath, Me., will be named the M. D. Cressy. She will be 290 feet long, 44 feet beam and 22 feet depth of hold.

The steel sailing ship Arthur Sewall, building by Arthur Sewall & Co., Bath, Me., will be launched Feb. 15. She is 345 feet long, 42 feet beam and 27 feet depth.

The Piscataqua Navigation Co., Portsmouth, N. H., has contracted with Charles Wood of Kennebuckport, Me., for a barge 100 feet in length by 26 feet beam.

Capt. James Davidson of West Bay has purchased the schooner Geo. B. Owen, which was wrecked on Lake Erie last fall and left on the hands of the underwriters. He will take her from Cleveland to West Bay, as soon as possible, to be fixed up and says he will ask $22,000 for her after she is repaired. He paid probably $5,000 for her. The Owen is a good vessel. She was built at the Davidson yard only five or six years ago.

A visit to the national capital may be enjoyed without extra cost for fare in going to Philadelphia and New York over Pennsylvania short lines. Tickets to those points via Washington may be obtained at same fares as apply over Pennsylvania direct lines, and will be good for ten days' sojourn at the national capital. For particular information apply to Pennsylvania lines ticket agents or address C. L. Kimball, assistant general passenger agent, Cleveland.

The American Ship Windlass Co., Providence, R. I., received a cable order the other day for sixty of tneir hand capstans and fifteen of their large steam capstans to go to Siberia.

TRADE NOTES.

The business of L. Black & Co., Detroit, opticians and dealers in marine glasses and other nautical specialties, has been incorporated and will hereafter be conducted under the name of the L. Black Co. The capital is $60,000. The old firm had been engaged in business in Detroit since 1850. In recognition of valuable service in the past Mr. A. Landsberg, senior member of the company, has taken in four of the employes—Herman W. Boers, Ben S. Cohen, Louis Kaichen and Carl Wagner—who have been with the house for a long time.

A catalogue recently issued by the Almy Water Tube Boiler Co. of Providence, R. I., shows that they installed boilers during the past year in a total of thirty-four vessels, which is greatly in excess of the number of vessels fitted by that company in any previous year. Included in the list are the president's yacht Sylph and other handsome steam yachts built at the Roach ship yard, Chester, Pa. The Almy company's catalogue, descriptive of their boilers, is neatly illustrated and well gotten up.

The business of L. Katzenstein, manufacturer of metallic packings of 357 West street, New York, has been, especially for the past several months, very prosperous. He has furnished packing for all vessels building at Cramp ship yard, including those for the United States and Japanese navies; also for all vessels at the Newport News yard, and the yachts at Seabury's, and for a large number of vessels being built in other yards. Foreign orders have also been unusually large.

Contracts have been awarded the Niles Tool Works Co. for furnishing the following tools to the Portsmouth navy yard: One 2-inch, single head bolt cutter; one 37-inch boring and turning mill; one duplex, steam-driven air compressor; one horizontal-type, automatic, step-motion heading, upsetting and forging machine; one 26-inch diameter by 10-inch face universal automatic gear-cutting machine.

Owing to the high quality and absolute safety of their hollow staybolt iron, the Falls Hollow Staybolt Co. of Cuyahoga Falls, O., are securing new customers daily among the manufacturers of marine boilers, as well as the railroad companies and locomotive builders. A late order for half a car load of this iron is from the Pacific coast.

The W. & A. Fletcher Co. of Hoboken, N. J., will rebuild the Macoochee of the Ocean Steamship Co.'s line. New boilers will be installed and the engines changed to triple expansion.

There were at least three parties figuring for the purchase of the Detroit steamer Clarence A. Black, which was finally bought a few days ago, for interests represented in the office of Pickands, Mather & Co., Cleveland. Mr. W. G. Mather of Cleveland, president of the Cleveland-Cliffs Iron Co., was among the first to enter into negotiations for the Black. M. J. Cummings of Oswego was also after her. It is said that the sale, including last fall's earnings of the vessel, represent a profit of probably $45,000 for the owners of the Black.

T. E. Ferris, who has for the past seven years served as chief draftsman for A. Cary Smith, naval architect of New York, has succeeded L. J. Nilson as manager of the yacht building establishment of Joseph Thomas & Son, Winan's Cove, Baltimore, Md.

The Canada Atlantic Transportation Co., which operated a line of steel vessels between Duluth, Chicago and Parry Sound last season, in connection with the Canada Atlantic Railway, cutting into Welland canal business, as well as the business of all the other lake and rail lines, is said to be negotiating for the purchase or construction of a couple of Canadian vessels that would be suited to carrying Manitoba grain from Port Arthur to Parry Sound, in competition with the practice up to this time of sending this grain to Buffalo or down the St. Lawrence. Although the Canada Atlantic Co. has been carrying out improvements on a big scale at Parry Sound—building costly elevators, store houses and docks—and has conducted its lake business in a highly creditable manner, it is repeatedly charged in Canada that the whole scheme of this lake and rail route is to sell the railway to the Canadian government.

The Berlin Iron Bridge Co. of East Berlin, Conn., has just shipped several carloads of bridge material to the Hawaiian islands. It is claimed that this will be the first American bridge to be placed on the island.

U. S. Engineer Office, Duluth, Minn., Jan. 16, 1889. Sealed proposals for setting in place concrete footing blocks, and building in place concrete superstructure on south pier Duluth Ship Canal, and for building and piling concrete footing blocks for north pier, Duluth Ship Canal, will be received here until noon Feb. 16, 1899, and then publicly opened. Information furnished on application. Clinton B. Sears, Major, Engineers. Feb. 9

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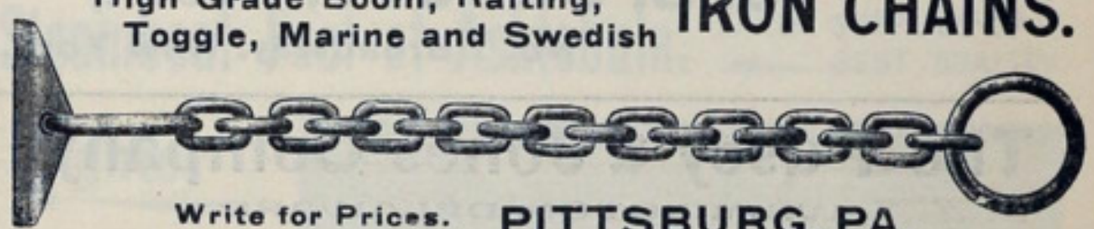

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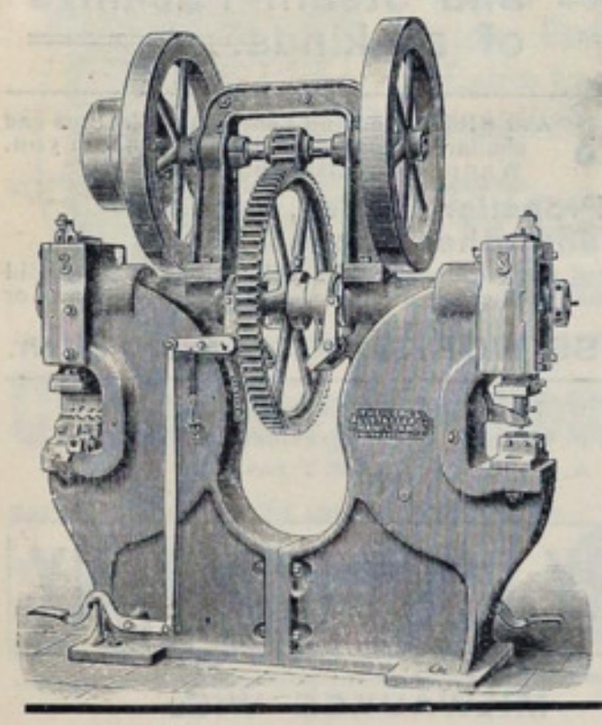

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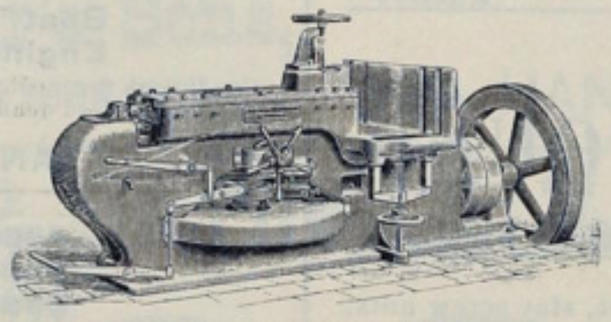

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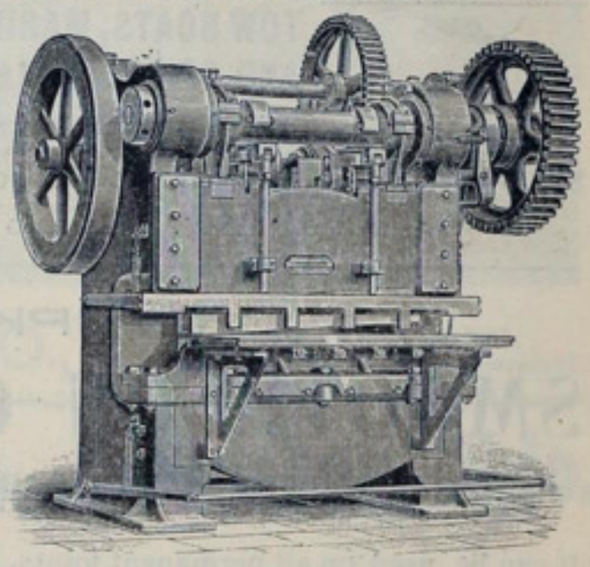

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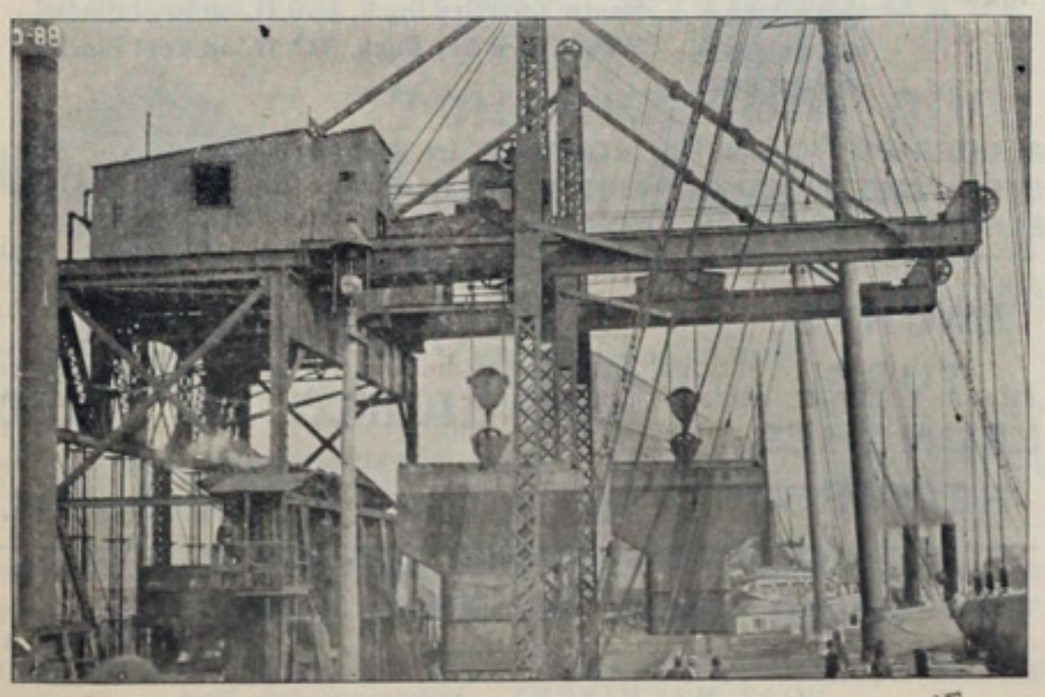

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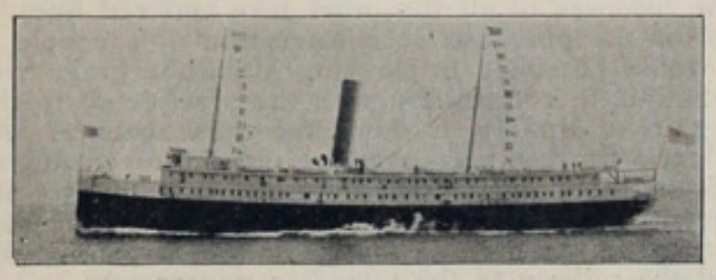

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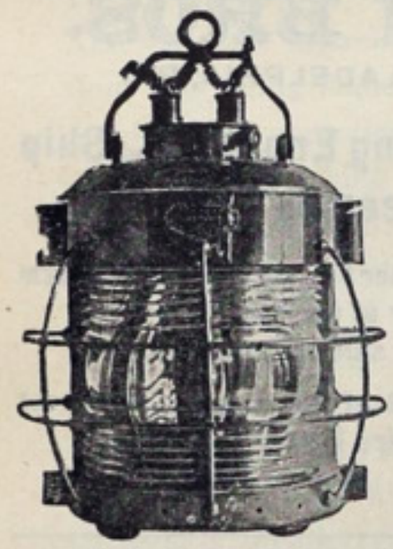

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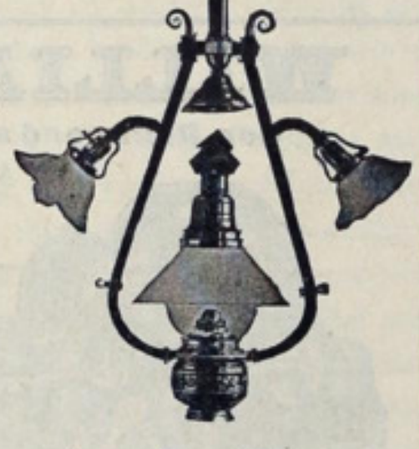

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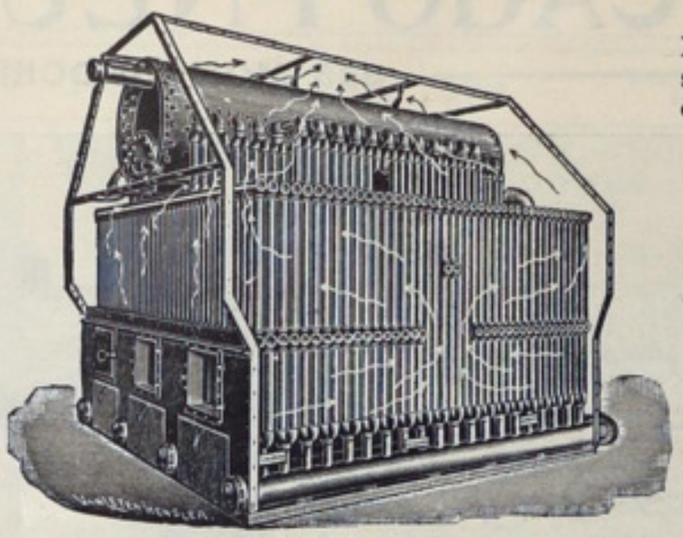

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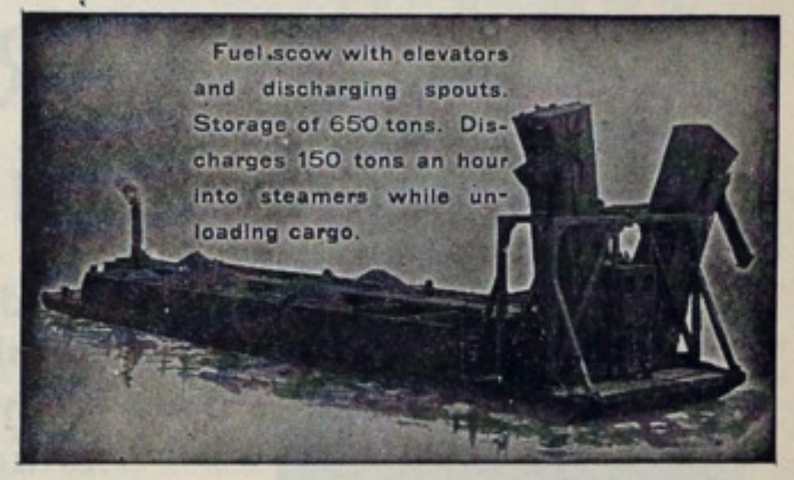
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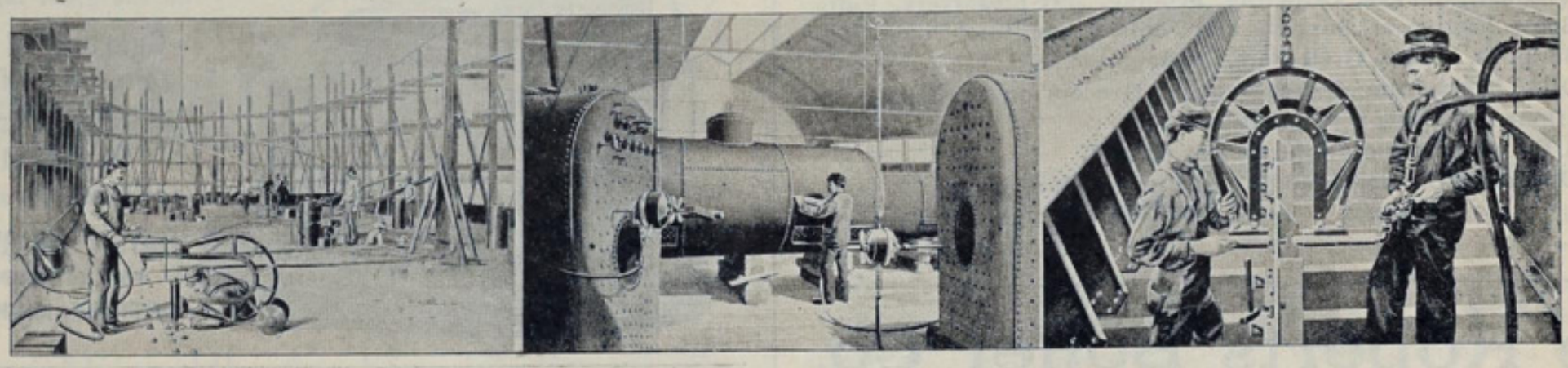

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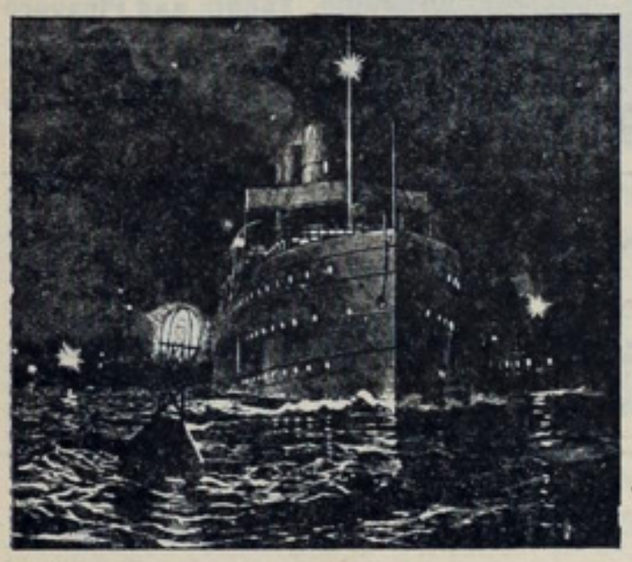

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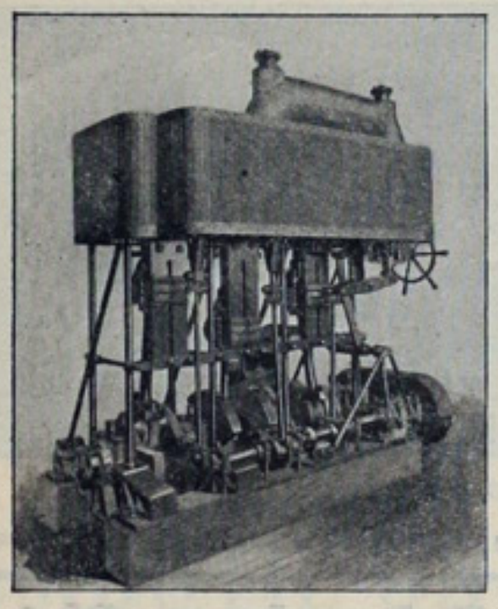

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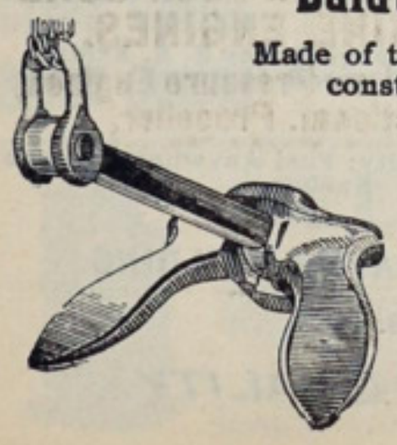

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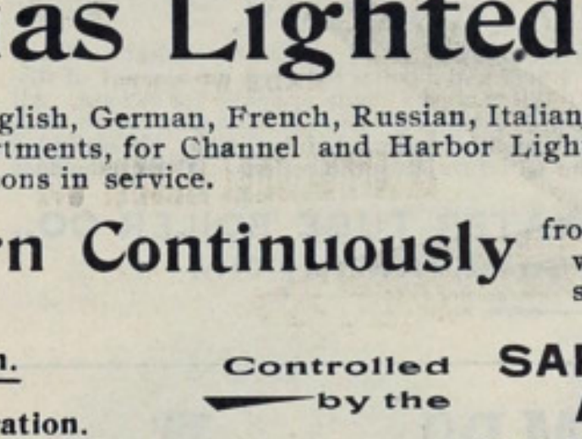

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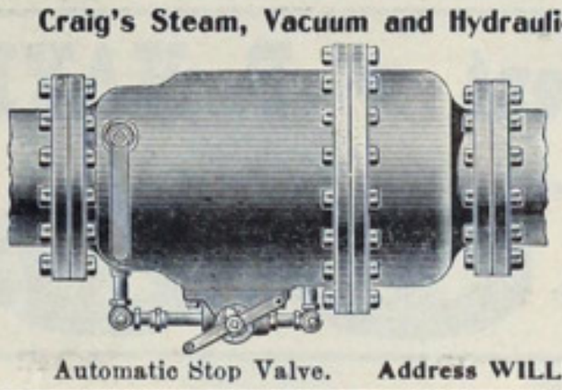

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